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STELLAR TEAM NOBLE MISSION

Missile Defense Agency Innovation, Science & Technology (DV)

Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) Summit

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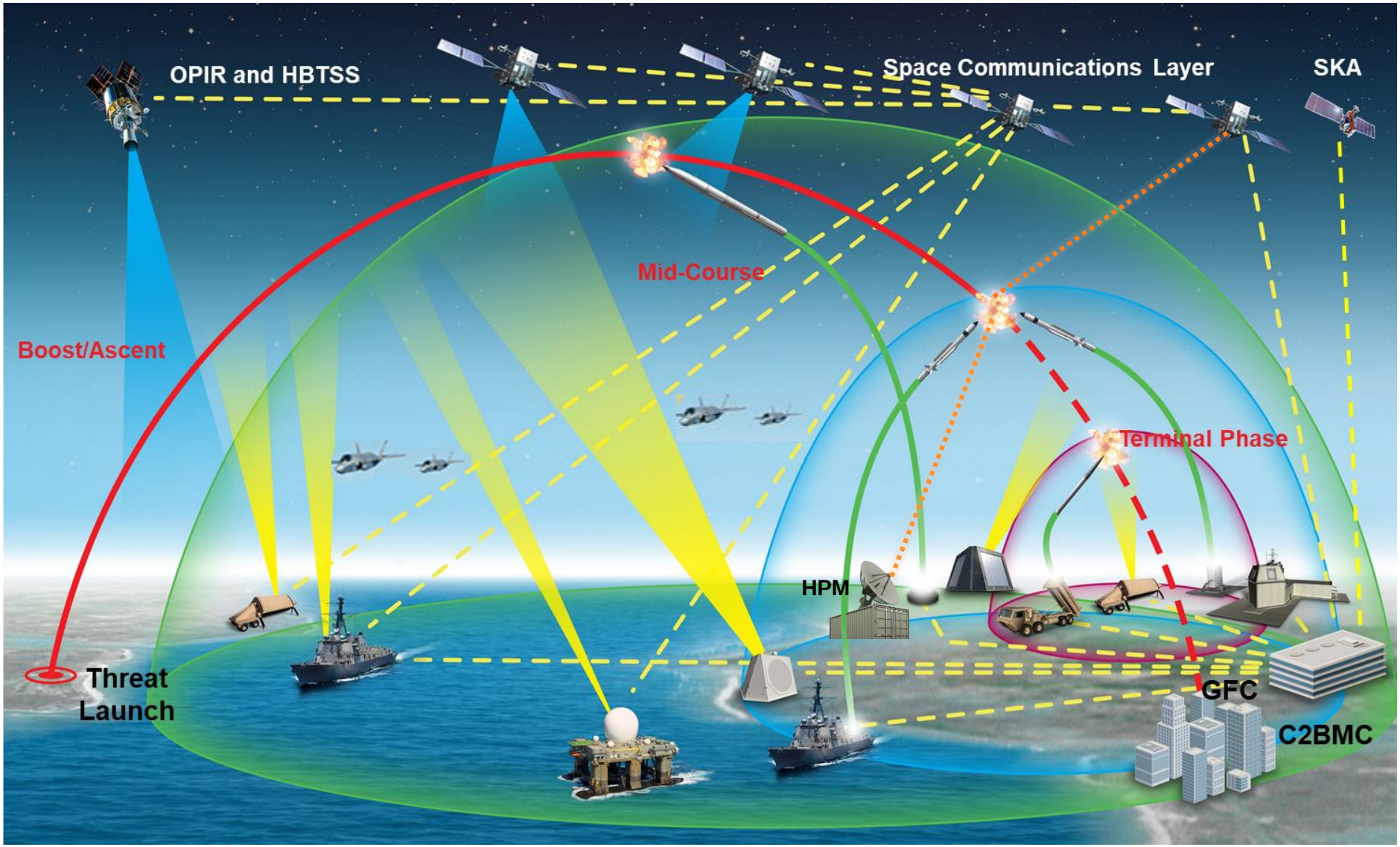
28-29 April 2021

10 Steps to Ballistic Missile Intercept

Video in Separate Attachment
Title: 10 Steps to Intercept

Future Missile Defense (Notional)



Innovation, Science and Technology

VISION:

Innovators of Future Missile Defense

MISSION:

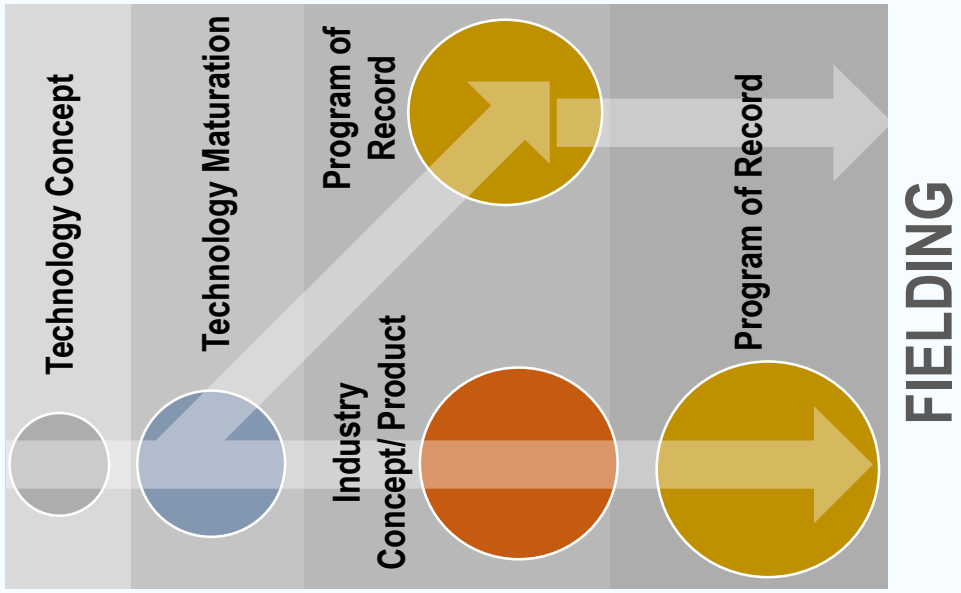
Deliver Advanced Concepts and Technologies to transform the Missile Defense System and outpace the threat

"Scientific results cannot be used efficiently by soldiers who have no understanding of them, and scientists cannot produce results useful for warfare without an understanding of the operations."

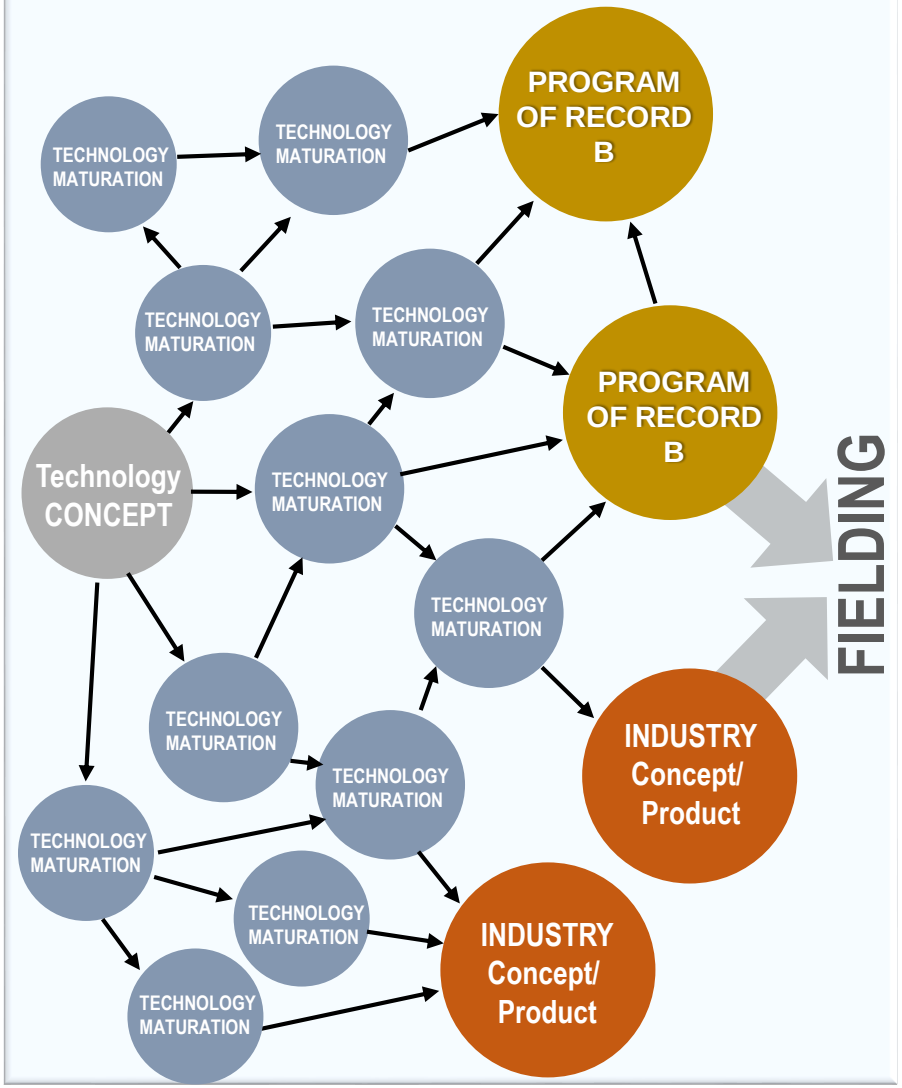
Theodore von Karman

Technology Transition Misconceptions

Assumed Technology Maturation Evolution



Observed Technology Maturation Evolution



Lifecycle Narrative

- **Assumed Evolution (Linear):**
  - Technology Transfer is generally assumed to take a linear path from concept through technology maturation and program of record, culminating in an industry product that is fielded
  - This is the exception, not the rule
- **Observed Evolution (~Random Walk):**
  - More commonly the path from technology concept to fielding goes through various technology maturation efforts, is combined in different ways with other technology efforts, sometimes transitions straight to industry, sometimes transitions to a program of record, all before reaching the field

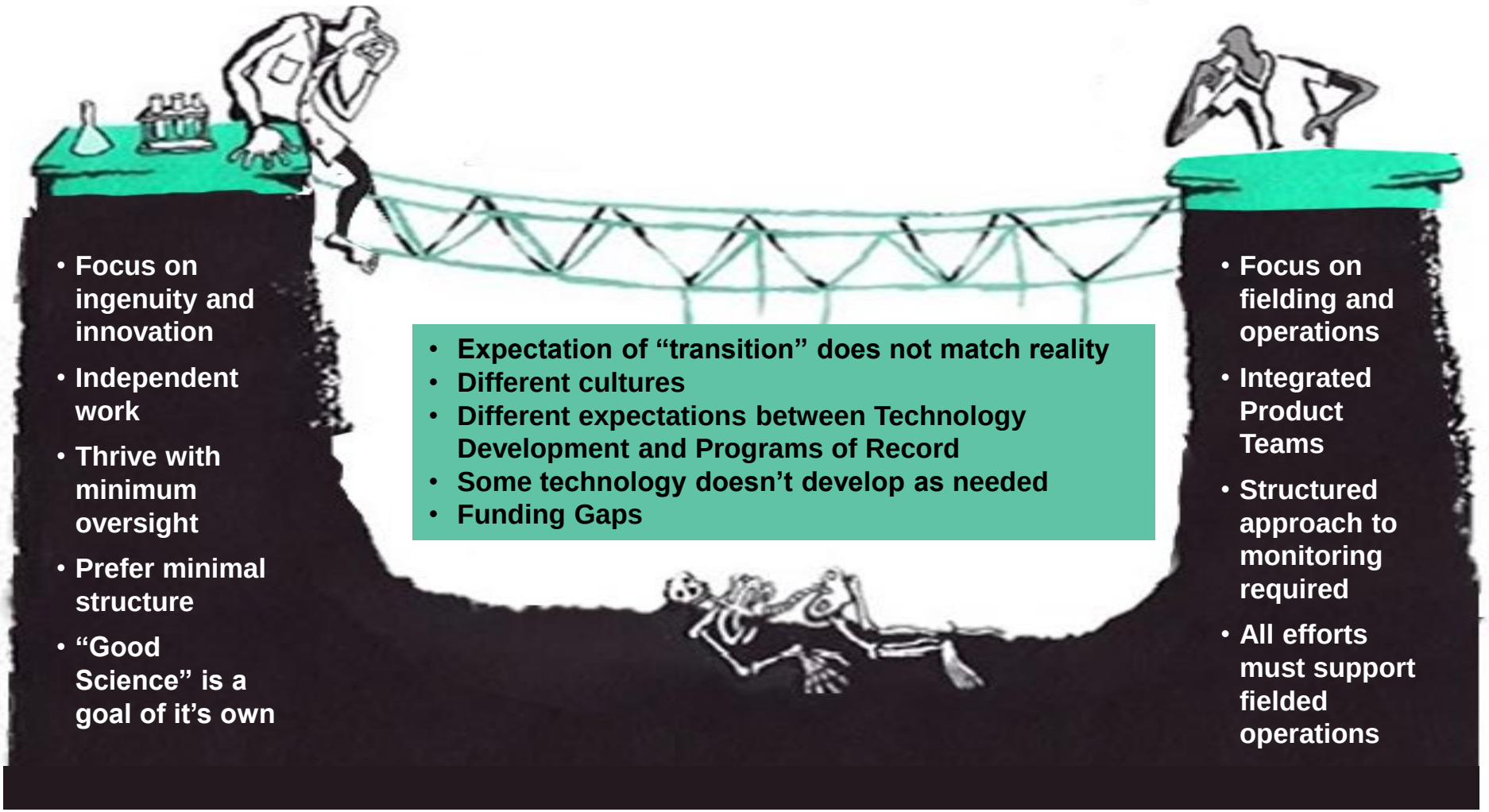
Technology Transition Challenges

S&T Initiatives

- Focus on ingenuity and innovation
- Independent work
- Thrive with minimum oversight
- Prefer minimal structure
- "Good Science" is a goal of it's own

Program of Record

- Focus on fielding and operations
- Integrated Product Teams
- Structured approach to monitoring required
- All efforts must support fielded operations



- Expectation of "transition" does not match reality
- Different cultures
- Different expectations between Technology Development and Programs of Record
- Some technology doesn't develop as needed
- Funding Gaps

Technology Transition Challenges

	Technology Development	Program of Record
Goals	risk reduction, prototype, demonstration, experiment, general understanding	fielded capability that can be operated and sustained
Level	Component or subsystem	Subsystem or full system
Build to	Notional Requirements	Clear, allocated requirements
Requirements	Guided by Future Architecture and Program needs	Highly defined, rigorously controlled requirements drive budgets and future investments
Funding	Lower funding, higher risk exploration	Higher, future efforts at risk for funding cuts
Teams	Small, agile teams	Larger, standing teams
Process	Tailored reviews, general (non-specific) requirements, tailored MAP/PMAP, no baselines, limited concern for “ilities”	Structured reviews, Detailed/specific requirements allocated to different system levels, full MAP/PMAP, baselines, address all “ilities”
Transition to	PoR or into technology refresh/obsolescence retrofit	Service or to fielding with operations and sustainment
TRL	≤ 6 (System/subsystem/prototype demonstrated in a relevant environment)	> 6 (system/subsystem/prototype demonstrated in an operational environment)

Interface Gap

Bridging the Gap Between Technology Development and Program of Record (PoR)

- Technology Roadmap
- S&T Strategy
- Transition plans
- Contract execution
- Future preparation

Technology Development

Successful Technology Transition

Program of Record

Technology Focuses

- Future Gap Resolution and Innovative/ new ideas focused
- Component/subsystem focus
- Lower funding limits scope of efforts
- Mature technology to lower technical risk (start with low TRL and take to higher)
- Define the bounds of requirements
- Extensive budget fluctuations drive frequent changes to efforts
- Structural strategy but agile approach
- Technology output, white papers, demos, experiments, and prototypes

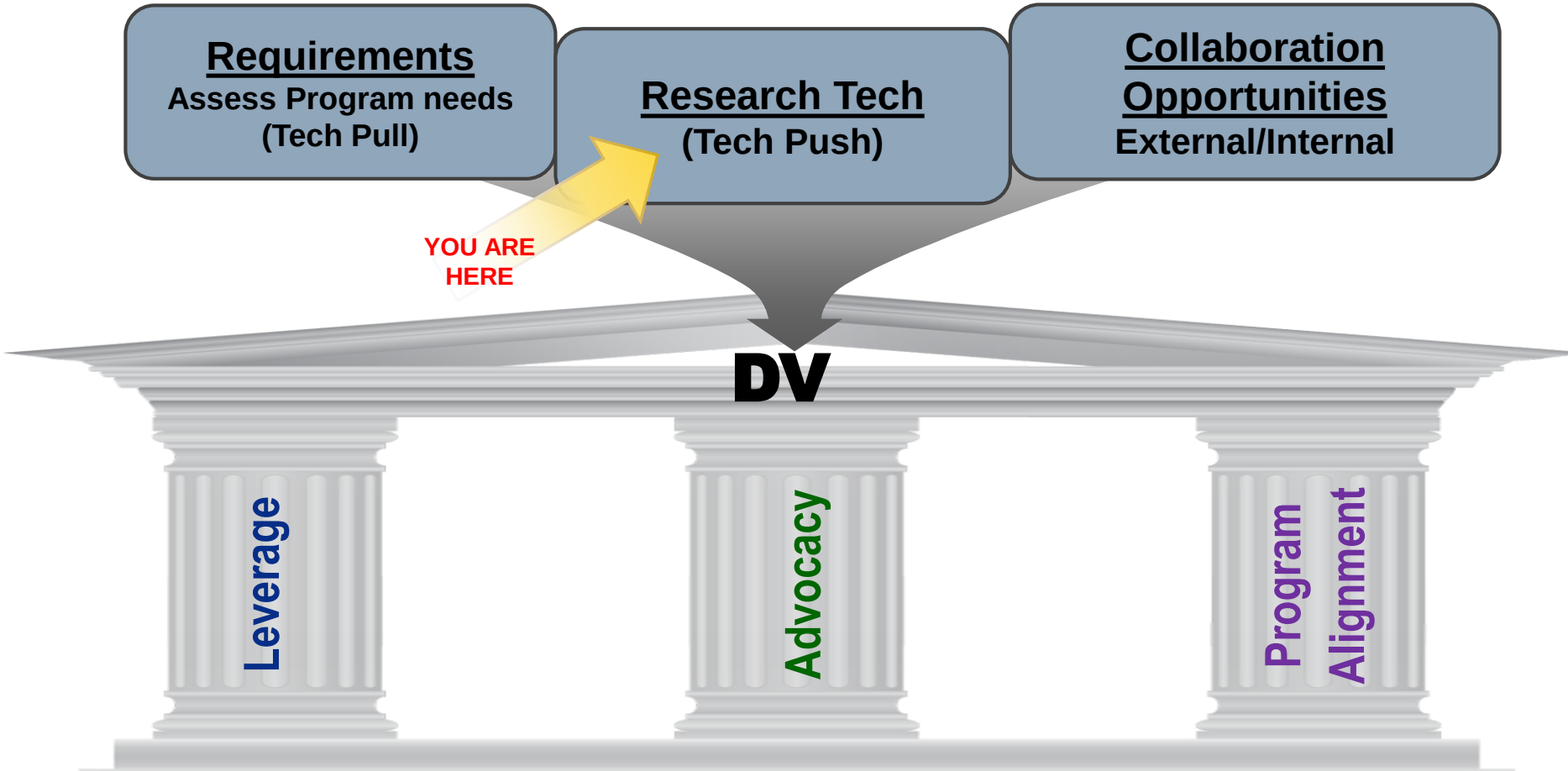
Technology "Valley of Death"

Program Focuses

- System of Systems focus
- Cost, schedule, performance drivers (high TRL)
- Build products within resource constraints
- Linked to Low technology risk (high TRL)
- Well-defined requirements, fielding, and operational approach ("-ilities", CONOPs, DOTMLPF, etc.)
- Requirements drive budget
- Structured program
- Fielding and operations delivery

Bring personnel with expertise and coordination from both sides to ensure transition success (Program Chief Technology Officers and Transition Agreements)

DV 2.0 I,S&T Strategy to Meet Needs



Position MDA for Future Success

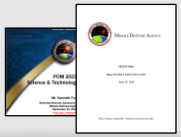
- Future prep
- Exceed financial expectations
- Leverage traditional & non-traditional contractors and Universities
- FFRDC/UARCs
- Fee for Service
- Fortify DV 2.0 foundation

I,S&T Strategy to Meet Needs

Capabilities & Gaps Tracker

Program Technology Needs (CTOs)

Achievable Capability List (ACL)



Technology S&T Roadmap, Strategy & Database

- DV Prioritized Work
- Prioritized Request for Agency Unallocated Funding List

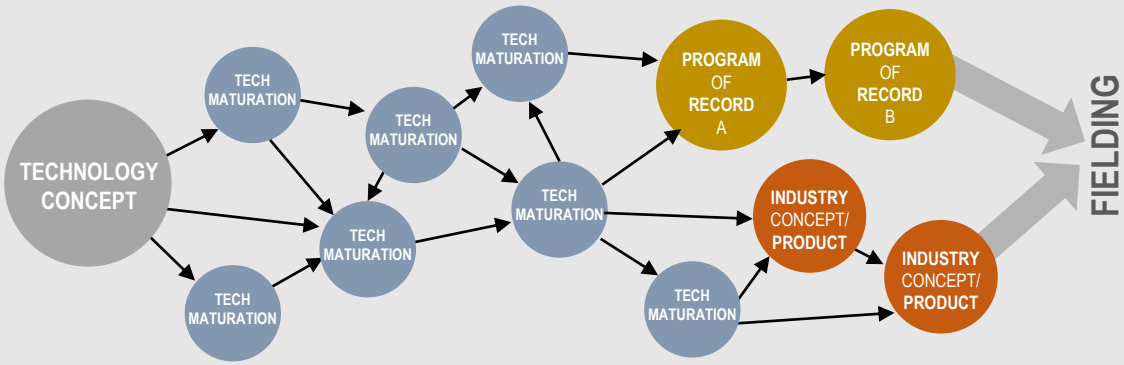
Technology Maturation

Collaboration Opportunity (DoD, DoE, International)

Revolutionizing Disruptive Technology Advances

- Hit-to-kill
- Sensors
- Additive Mfg

Technology Transition



Innovation, Science & Technology Influence across the DoD Communities of Interest

AIR PLATFORMS (HYPERSONICS)
A standing forum for developing consensus and identifying S&T issues related to air platforms

AUTONOMY & AI/ML (AD Focused)
Closely examines the DoD's S&T investments of autonomous & AI/ML systems

COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS AND INTELLIGENCE (C4I)
Coordinates DoD C4I S&T portfolio investments and reviews DoD organization's strategic plans

COUNTER-IED (ALUMNI COI)
Crosscutting S&T focus areas to address enduring challenges of IEDs

COUNTER-WEAPON OF MASS-DESTRUCTION (WMD) (ALUMNI COI)
Communicates among components to discover innovative technologies to enhance DoD capabilities in Counter-WMD

DIRECTED ENERGY
Developing lasers and similar directed energy capabilities to achieve national security objectives

ELECTRONIC WARFARE
Military action involving electromagnetic (EM) and directed energy to control the electromagnetic spectrum (EMS)

ENERGY AND POWER TECHNOLOGIES
Provide technologies to enable intelligent power and energy management to enhance operational effectiveness

GROUND AND SEA PLATFORMS
Topics associated with a broad range of platform technologies for both ground and sea systems

HUMAN SYSTEMS
Develop and deliver innovative human-centered technologies to select, train, design, protect and operate for improved and quantified mission effectiveness

KINETIC WEAPONS
Coordinates all S&T pertaining to weapons propulsion, DE, position, navigation, and timing (PNT), undersea weapons, and ordnance technology applications

MATERIALS AND MANUFACTURING PROCESSES
Developing technology-based options for advanced materials and processes for the DoD

SPACE
Facilitate collaboration and leverage complementary investments of the space Science and Technology (S&T) efforts performed by the DoD

QUANTUM TECHNOLOGIES
Develop and deliver innovative quantum information science for quantum computing, sensing, navigation, timing, networking, and analytics to the warfighter

BIOTECHNOLOGY
Utilizing research in life sciences to inform our understanding of how nature senses the environment

CYBER
Collaborate to discover innovative technologies in cyberspace

SENSORS
A forum for sharing new ideas, technical directions and technology opportunities

ADVANCED ELECTRONICS
Technologies that provide for the processing of information

BIOMEDICAL ASBREM
Sustains and improves medical readiness and warfighting needs

MDA S&T Areas of Focus

Advanced Research

- Component Technology Development
- Radiation Hardening
- Advanced Materials
- Disruptive technology
- Nanosat technology

Advanced Concepts and Performance Assessment

- Modeling & Simulations supporting HBTSS
- Digital Missile Defense
- Cyber Security
- Artificial Intelligence / Machine Learning
- Hardware in the Loop
- War Gaming

Component Technology

- Propulsion
- Seeker
- Guidance
- Navigation
- Communications
- Advanced materials
- Controls

Directed Energy

- Beam On Laser Technology (BOLT)
- Lethality Studies
- High Power Microwave
- Microwave test bed
- Diode Pumped Alkali Laser (DPAL)
- Transition Technology to Industry
- Pulsed Lasers

SBIR/STTR Innovation Summit Topics

- Technology Maturation Overview
- Research Area Lead (RAL) Introductions
  - Ground-Based Midcourse Defense
  - Targets and Countermeasures
  - Terminal High Altitude Area Defense (THAAD)
  - Test Instrumentation
  - Sensors and Directed Energy
  - Quality, Safety, and Mission Assurance (QSMA)
  - Sea-Based Weapon Systems
  - MANTECH – Mr. Steven Cox
  - Technology Maturation
  - Technology Protection
  - Lethality & Survivability
  - Modeling & Simulation
- Defense Industrial Base (DIB) Cyber Security
- Project Spectrum (A DoD, OSBP Initiative)
- The Office of the Under Secretary of Defense (OUSD) Research & Engineering (R&E)
- Department of Defense Office of Small Business Programs Overview
- SBIR/STTR Program Overview
- Hypersonics Success Story Overview
- Nanosat Success Story Overview
- Writing a Winning Proposal (panel)
- SBIR Contracts Office
- Mentor Protégé Program
- Commercialization and Transition Office (Phase III)
- One-on-Ones with MDA SBIR/STTR Research Area Leads

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